

TOWARDS AN EARLY JURASSIC NUMERICAL TIME SCALE: MOCHRAS FARM BOREHOLE

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The Early Jurassic (201.3 to 174.1 Ma) was initiated by the end-Triassic mass extinction and climatic perturbation (with significant global warming). It was followed by several smaller and larger climatic perturbations throughout the Sinemurian and Early Pliensbachian, a significant cooling event in the Late Pliensbachian, and culminating in the hothouse conditions of the Early Toarcian, coinciding with the Toarcian Oceanic Anoxic Event (T-OAE). The gradual evolution of Early Jurassic global climate, as well as superimposed rapid climatic perturbations appear to be closely linked to changes in the exogenic carbon cycle at that time, which are suggested to be linked to e.g. long and short-term astronomical control on Earth's energy distribution, opening and closure of ocean-gateways and associated changes in ocean circulation, changing global weathering rates, a changing efficiency of the carbonate pump, the relative importance of overall marine and terrestrial carbon drawdown and burial, and carbon release from large igneous province volcanism and associated processes. To constrain the (causative) links and feedback mechanisms between these Earth system processes it is essential to understand durations and rates of change of perturbations in Earth system parameters.

Here, we present integrated carbon-isotope and elemental concentration data from the entire Lower Jurassic sedimentary succession of the Cardigan Bay Basin (Mochras Farm Borehole, UK). This expanded and biostratigraphically complete record allows for detailed (precession to short eccentricity-scale) constraints on the Early Jurassic time-scale. We use this to explore short and longterm orbital forcing of the climate and environment at this mid-latitude site.